

Specification No. 2B047-S3116-40-032  
Code Ident 80091  
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NON COMPLEX ITEM PRODUCT  
FABRICATION SPECIFICATION

FOR

WINCH, SIDE LOADABLE WARPING TUG  
(Type C3 Specification)

CONFIGURATION ITEM NUMBER - 6139064

## 1. SCOPE

1.1 **Scope.** This specification establishes the requirements for manufacture, inspection, and Government acceptance of the Hydraulic Winch for the Side-Loadable Warping Tug, a non-complex item of Sealift Support Facilities (SSF).

## 2. APPLICABLE DOCUMENTS

2.1 **Government Documents.** The following documents of the issue in effect on date of invitation for bids or request for proposal, form a part of the specification to the extent specified herein.

### SPECIFICATIONS:

#### Federal

FF-T-276 - Thimbles, Rope

RR-W-410 - Wire Rope and Strand

#### Military

MIL-H-6083 - Hydraulic Fluid, Petroleum Base, For Preservation and Operation

MIL-I-45208 - Inspection System Requirements

MIL-L-2104 - Lubrication Oil, Internal Combustion Engine, Tactical Service

MIL-L-2105 - Lubricating Oil, Gear, Multipurpose

MIL-P-24441 - Paint, Epoxy-Polyamide, Black, formula 160, Type IV

#### NAVFAC

2B047-S3116-50-035 - Process Specification for Painting

### STANDARDS:

#### Federal

FED-STD-H28 - Screw Thread Standards for Federal Service

NAS-1638      Cleanliness Requirements of Parts  
Used in Hydraulic Systems

Military

MIL-STD-721- Definitions of Terms for Reliability  
and Maintainability

MS-51844 - Sleeve, Swaging-Wire Rope

DRAWINGS:

NAVFAC

NAVFAC Drawing No.    Title

80091-6139028      - SLWT Winch Skid Assembly

80091-6139064      - Hydraulic Winch (Including  
subordinate dwgs)

Copies of specifications, standards, handbooks, drawings, and publications required by manufacturers in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting officer.

2.2 Non-government Documents. The following documents form a part of this specification to the extent specified herein. Unless otherwise indicated, the issue in effect on date of invitation for bids or request for proposal shall apply.

STANDARDS:

American Society for Testing and Materials (ASTM)

A6      - General Requirements for Rolled Steel  
Plates Shapes, Sheet Piling, and Bars for  
Structural Use

A182 - Forged or Rolled Alloy-Steel Pipe Flanges,  
Forged Fittings, and Valves and Parts for  
High-Temperature Service

A269 - Seamless and Welded Austenitic Stainless  
Steel Tubing for General Service

A276 - Stainless and Heat-Resisting Steel Bars and  
Shapes

A312 - Seamless and Welded Austenitic Stainless  
Steel Pipe

F593 - Stainless Steel Bolts, Hex Cap Screws, and Studs

F594 - Stainless Steel Nuts

Application for copies of ASTM documents should be addressed to the ASTM, 1916 Race Street, Philadelphia, PA 19103.

American Welding Society, Inc. (AWS)

D1.1 - Structural Welding Code

Application for copies should be addressed to American Welding Society, Inc., N.W. Le Jeune Rd., Miami, FL 33125.

Technical society and technical association specifications and standards are generally available for reference from libraries. They are also distributed among technical groups and using federal agencies.

2.3 Order of Precedence. Unless otherwise specified in the contract, in the event of a conflict between this specification and the referenced cited herein, this specification shall govern.

### 3. REQUIREMENTS

#### 3.1 Performance.

3.1.1 Winch Environment. The winch assembly shall be capable of withstanding the LST-side-loading-induced 90 degree rotation about the SLWT longitudinal axis (port side down) with a ship's roll of +30 degrees when side loaded. All liquids shall be positively contained through all stages of the rotation. The winch assembly shall be resistant to salt water over the deck. The winch engine shall start in less than 30 minutes. When engine operating temperatures are reached, the winch shall operate at full power in any ambient air temperature between -20 and +140 degrees Fahrenheit in a marine environment.

3.1.2 Winch Line Pull. The winch drums shall be operable in two speed ranges: high speed/low load or low speed/high load. In the high speed/low load range the winch shall deliver separately to each drum, during hoisting or lowering, a minimum dynamic pull of 1,500 pounds at 200 feet per minute line speed bare drum. In the low speed/high load range the winch shall deliver separately to each drum, during hoisting or lowering, a minimum dynamic pull of 27,000 pounds at 50 feet per minute line speed bare drum. Both winch drums shall have independent freefall capability.

3.1.3 Winch Safety and Survivability. Brakes shall be fail safe and set automatically when hydraulic power is lost. The winch drum brakes shall hold loads without slipping up to 150% of the rated bare drum capacity of 27,000 lbs, or 40,500 lbs. The winch installation shall provide an alternate means of lowering a suspended load when hydraulic power is lost. A freefall circuit shall be used to allow the forward and the after drums to pay out freely, both together and independently. All components shall be capable of withstanding up to seven times the force of gravity vertically. All components shall be capable of withstanding any vibration caused by the winch operation. The drums, when fully spooled and dogged, and the drum support components, like drum shafts, bearings, frame and mountings as well as the drum dog, shall withstand the loads induced up to the nominal breaking strength of the one inch wire rope (103,400 lbs) without permanent deformation.

3.1.4 Reliability and Maintainability. Mean Time Between Failures (MTBF) of the complete winch shall be 1,000 hours. Mean Time to Repair (MTTR) shall be four hours. MTBF and MTTR are defined in MIL-STD-721.

3.2 Physical Characteristics. The winch shall be fabricated and assembled in accordance with NAVFAC Drawings listed in section 2.1 above.

3.2.1 Drawings. The drawings forming a part of this specification are the approved Product Baseline drawings. No deviation from the prescribed dimensions or tolerances is permissible without prior approval by the contracting officer. Where tolerances could cumulatively result in incorrect fits, the contractor shall provide tolerances within those prescribed on the drawings to insure correct fit, assembly, and operation of the system. Any data (e.g., drawings, layouts, flow sheets, processing procedures, etc.), prepared by the contractor or obtained from a vendor to support fabrication and manufacture of the production item shall, upon request, be made available inspection by the contracting officer or his designated representative.

3.2.2 Materials. Materials used shall be free from defects which could adversely affect the performance or maintainability of individual components or of the overall assembly. Materials not specified herein shall be of quality equal to that used in commercial practice for the same or equivalent application. Unless otherwise specified herein, all equipment, material and articles incorporated into the work covered by this specification are to be new with the manufacturer's warranty and fabricated using recovered materials (see 6.3.1) to the maximum extent possible without jeopardizing the intended use. Referenced documents which

specify virgin materials or prohibit the use of reclaimed or recovered materials shall be referred to the Contracting Officer for verification. Unless otherwise specified, none of the above shall be interpreted to mean that the use of used or rebuilt products are allowed under this specification.

**3.2.2.1 Steel Fabrication.** Steel used in the fabrication of metal parts shall conform to ASTM A6/A6M for tolerances.

**3.2.2.2 Fasteners.** Unless otherwise specified on the drawings, screw threads shall be in accordance with FED-STD-H28, and fasteners shall be in accordance with group 2 of ASTM F593 and F594. All bolts and screws securing panels in gage boards or consoles shall be "captive", i.e., when panels are removed, bolts and screws shall remain with the panel.

**3.2.2.3 Cleaning and Painting.** The winch assembly and its associated foundation shall be cleaned, painted, and touch-up painted in accordance with NAVFAC Specification No. 2B047-S3116-50-035.

**3.2.3 Marking.** The National Stock Number (NSN) and Navy registration number (see para. 6.2) shall be stenciled on the winch. Both numbers shall be located on the right side (looking forward) of the winch foundation. All numbers shall be applied in water resistant gloss black epoxy paint in accordance with MIL-P-24441 formula 160, Type IV. Characters shall consist of block letters and Arabic numerals at least 1 inch high.

**3.2.3.1 Identification Plate.** An identification plate will be furnished by the Contracting Officer for each winch. The contractor shall stamp his serial number, the NSN, the Navy registration number and other applicable data in the blank spaces of the plate provided for that purpose. The contractor shall securely affix the plate to each winch in the location specified by NAVFAC Drawing No. 80091-6139064 with brass screws or bolts not less than 1/8 inch in diameter. The applicable nomenclature contained in the contract item description shall be placed in the top blank.

**3.3 Winch Assembly.** All winch components shall be mounted on a common foundation. The winch shall be self-contained with two drums, a gypsy, a control panel and a hydraulically-started diesel prime mover. The winch shall not exceed the following dimensions: length 13 feet, width 7 feet, height 5 feet, and weight 12,000 pounds (including fuel and fluids but excluding the wire rope). All brake and clutch friction surfaces shall be enclosed. The winch foundation shall have a bolt pattern as shown on NAVFAC Drawing No. 80091-6139028. The winch drums shall have a minimum diameter of 16 inches

and each drum shall have a capacity to spool 700 feet of 1" diameter wire rope with no less than 2 inches left free to the outer drum flange diameter. The drum barrels shall be smooth and the distance between the flanges shall be dimensioned such as to achieve proper multilayer spooling. The forward winch drum shall pay out and hoist over the top and permit unrestricted operation in a forward direction from 20 degrees below horizontal to 60 degrees above horizontal. The after drum shall pay out and hoist under the bottom and permit unrestricted operation in any backward direction from 20 degrees below horizontal to 60 degrees above horizontal. Each drum shall be provided with a drum dog. Each drum shall be provided with an automatic setting brake.

**3.3.1 Wire Rope.** Each drum shall be supplied with a minimum of 700 feet of 6 x 19, one inch diameter wire rope, type I, class 2, construction 4, extra improved plow steel, IWRC in accordance with Federal Specification RR-W-410. The forward and after wire rope shall terminate with a thimble and swaged end sized for one inch diameter wire rope. Wire rope thimbles shall conform to Federal Specification FF-T-276, Type III. Wire rope swaging sleeves shall conform to MS-51844. The wire rope shall be spooled on the drums under tension to prevent layers from shifting and kinking the cable.

**3.3.2 Power Supply.** The winch shall be hydraulically powered and hydraulically controlled in accordance with the NAVFAC Drawings in section 2.1. Power input to the hydraulic loop shall be provided by a diesel engine, Detroit Diesel Allison 4-53T, 175 horsepower turbocharged, capable of driving both drums simultaneously. The winch shall be provided with a hydraulic starting system consisting of an accumulator, automatic recharging pump (powered by the prime mover) and relief valve. In addition, an integral hand pump shall be provided to charge the accumulator completely in no more than 10 minutes. The engine access panels shall be quickly and easily removed for checks and repair to the diesel engine. The diesel engine shall be directly coupled through a mechanical drive plate to the hydraulic pump(s), sharing a common drive shaft but hydraulically independent. Hydraulic power shall be provided by multiple fixed-displacement pumps and motors.

**3.3.2.1 Cold Start Package.** A cold start package shall be installed on each winch engine in accordance with NAVFAC drawing 80091-6139064. The system shall be non-electrical and operable from the winch control panel.

**3.3.2.2 Fast Lube Oil Change System.** A fast lube oil change system (FLOCS) shall be installed in accordance with the NAVFAC Drawings in section 2.1 on each winch to facilitate

drainage of waste motor oil during engine maintenance. The hose shall be clamped to prevent chafing. All fittings and couplings shall be of corrosion resistant steel for a marine environment.

3.3.2.3 Hydraulic Controls, Lines and Fluids. All controls shall be manually operated valves, the external-exposed moving parts and pivoting hardware of which shall be made of corrosion resistant steel. Control valve handles shall be manually oriented to pull toward the operator for winch reel-in of line. Winch main system relief valves shall be set to obtain no greater than 2,500 psig measured at hydraulic motor test ports. Gages shall be installed on the control panel which will permit the operator to monitor the hydraulic system pressure, the engine water temperature, and the engine lubricating oil pressure. Gages shall withstand the marine environment without corrosion, fogging or crazing and shall be calibrated prior to installation. This calibration data shall be delivered to the government in accordance with CDRL requirements. All gages and control valves shall be labeled using Gothic letters at least one inch in size. Labels shall be photo-etched stainless steel attached to the console with stainless steel, captive fasteners, i.e., when the labels are removed, bolts and screws shall remain with the label panel. Fasteners for the control panels shall be made of corrosion resistant steel, and shall be resistant to the marine environment. A removable protective shield to protect the controls from impact damage during lifting operations of the Side Loadable Warping Tug (SLWT) shall be provided for the winch control panel. Required control functions are shown in the following table:

<u>Winch Drum Function</u>	<u>Speed</u>	<u>Fwd Drum</u>	<u>After Drum</u>	<u>Both Drums Together</u>
Reel-in under load	High	Yes	Yes	Yes
(basic operation)	Low	Yes	Yes	Yes*
Pay-out under load	High	Yes	Yes	Yes
	Low	Yes	Yes	Yes
Free-fall	N/A	Yes	Yes	Yes
Reel-in one drum under load, payout other drum under load	High	N/A	N/A	Yes
	Low	N/A	N/A	Yes
Lock Drum	N/A	Yes	Yes	Yes

\*Combined load equivalent to maximum capacity of a single drum.

The hydraulic system shall use MIL-H-6083 corrosion inhibiting petroleum hydraulic fluid as the working medium. The diesel engine shall have a heavy duty oil in accordance with MIL-L-2104, 30 weight. All three gearboxes shall use 90 weight hypoid gear oil in accordance with MIL-L-2105. All hydraulic hoses shall be secured with support clamps. All stainless steel hydraulic lines shall have support clamps with inserts to resist vibration, flexing or movement of the lines. Any steel hydraulic tubing used in the winch assembly shall conform to ASTM A269 or ASTM A312 type 304. All hydraulic fittings, adapters and hose fittings shall conform to ASTM A182 or ASTM A276 type 316 stainless steel, and shall be standard off-the-shelf components. The hydraulic oil sump shall be fitted with an easily readable temperature gage and with sight gages for measuring oil level. The hydraulic system filter shall indicate visually when element replacement is required. Tests ports for measuring hydraulic pressure at critical areas shall be provided to assist in equipment maintenance and repair.

### 3.3.3 Auxiliary Equipment.

3.3.3.1 Gypsy. A hydraulically powered gypsy shall be provided on the forward, left-hand side of the winch. The gypsy shall have a minimum static line pull of 3,500 pounds continuous at 80 feet per minute with a 5,000 pound intermittent pull capability at no specific speed.

3.3.3.2 **Power Take-off.** A power take-off shall be provided to permit the operation of auxiliary hydraulic equipment. The power take-off shall support power requirements equal to those of the forward drum. A quick disconnect capability shall be provided for all lines and a case drain line shall be installed.

3.3.4 **Interchangeability.** All parts, components, and fittings are to be fabricated and assembled so that units of the same type shall be interchangeable. All items with the same end usage shall be functionally and dimensionally interchangeable.

3.4 **Workmanship.** Workmanship shall exhibit the quality in fabrication detail and appearance typically produced by competent and conscientious journeymen. As a consequence each winch shall be delivered in "like-new" condition with no exceptions.

3.4.1 **Welding.** Manual and machine welding processes and material shall conform to AWS D1.1. The surface of parts to be welded shall be free from rust, scale, paint, grease, or other foreign matter. Welds shall be full and continuous, except that intermittent welds shall be used where specified on drawings. A welding sequence shall be developed to minimize the residual stresses and distortion in the steel. Peening shall not be used to correct faults or leaks. Weld spatter, slag, and other byproducts of manufacturing processes, procedures or conditions that may affect appearance and performance of the systems shall be removed.

3.4.2 **Welding Qualification.** All welders shall be qualified for the types of welds and for welding positions which they will use in production. Qualification shall be on the type of base material and filler utilized in actual construction or on similar alternate materials not requiring operator requalification. Welder qualification shall be performed in accordance with the applicable sections of the AWS D1.1. Test welds and copies of the qualification record for each qualified welder shall be kept by the manufacturer or contractor and shall be available to authorized government representatives.

3.5 **First Article Item.** When specified (see 6.2), a complete hydraulic winch assembly shall be provided to demonstrate the ability of the winch to achieve the performance and configuration requirements specified herein (see 4.2). The first article winch shall be the first item produced using production tooling and procedures and shall reflect the approved product baseline. The first article winch shall be tested and inspected by the contractor and witnessed by the government. The Contractor shall prepare

and submit for approval a first article test report reflecting the results of the testing and inspection. Production of winches shall not commence until the Contracting Officer approves the first article test report. The contractor shall retain the first article winch in the approved configuration as a baseline for; subsequent production and quality conformance inspection (see 4.3). The first article winch shall be preserved in accordance with 5.1, stored in dry, secure location and be delivered to the Government in like new condition as the last delivery on the contract.

#### 4. QUALITY ASSURANCE PROVISION

4.1 General. The contractor shall establish an inspection system in accordance with MIL-I-45208. Contractor inspection system program implementation procedures and inspection records shall be subject to review by the government. The contractor shall insure that the purchases from vendors and subcontracted work are controlled to the extent specified in MIL-I-45208. All items shall meet the requirements of Section 3 and applicable reference documents. The inspections set forth in this specification shall become a part of the contractors overall inspection system or quality program. The absence of any inspection requirements in the specification shall not relieve the contractor of the responsibility for assuring that products or supplies submitted to the government for acceptance comply with all requirements of the contract. Sampling in quality conformance inspection/testing does not authorize submission of known defective material, either indicated or actual to the government, nor does it commit the government to acceptance of defective material.

4.1.1 Responsibility for Inspection. The contractor is responsible for the performance of all inspection requirements specified herein. The contractor may use his own or any other facilities suitable to perform the inspection and test requirements specified.

4.1.1.1 Facilities. The contractor shall provide parking and office facilities for use on a temporary basis during those times when Government personnel are present to witness inspections or tests. Telephone toll calls will not be charged to the contractor's telephone bill.

4.2 First Article Inspection. The First article inspection shall consist all inspections and tests identified in 4.2.1, 4.3 and any other test requirements defined in the contract. First article inspection and test results shall be recorded and maintained on file by the contractor and submitted as part of the first article test report. The recorded data

shall be available for Government review upon request. Failure of the first article winch to satisfy the acceptance requirements of the tests and inspections specified herein shall be cause for rejection.

4.2.1 **Side Tilt Test.** The winch assembly, with all fluid chambers filled, shall be rotated 90 degrees with the port or left side down. The side loading test position shall be held for a period of at least eight hours. In this orientation, a visual inspection shall be made to verify that no external leakage occurs during this time period.

4.3 **Quality Conformance Inspection.** Quality conformance inspection shall be performed on each winch assembly. This inspection shall include the examination of 4.3.1, the tests of 4.3.2 and the packaging inspection of 4.4.

4.3.1. **Examination.** Each winch assembly shall be examined prior to testing for compliance with the requirements specified in Section 3 of this specification. Any approved redesign or modification proposed by the contractor shall receive particular attention for compliance with the approved change/deviation/waiver. This element of inspection shall encompass all visual examinations and dimensional measurements. Noncompliance with any specified requirement or presence of one or more defects shall constitute cause for rejection.

4.3.1.1 **Material Examination.** The contractor shall visually verify that all material used is as specified on applicable drawings.

4.3.1.2 **Fastener Examination.** The contractor shall verify by mechanical methods that fasteners conform to proper dimensions and thread characteristics as cited in this specification and in the applicable drawing.

4.3.1.3 **Welding Examination.** Inspection of welds and weldments shall be performed utilizing the proper mechanical gages, fixtures, and weld gages. Applicable sections of the AWS Welding Inspection Manual shall be followed including, but not limited to, verification of the following:

- a. Dimensional accuracy (including warpage).
- b. Conformance with drawing requirements (this involves the determination of whether all required welding has been done, and complies with drawing requirements for size and length).
- c. Acceptability of appearance, including such attributes as surface roughness, weld spatter, etc.

- d. The absence of unfilled craters, pockmarks, undercuts, overlaps, cracks, and excessive grinding.
- e. Random non-destructive tests when specified by the contract or as required by the applicable drawing.
- f. All full penetration welds shall be non-destructively tested by either ultrasonic or x-ray in accordance with AWS D1.1. Extent of testing by ultrasonic or radiographic method shall be spot testing of each weld. The spot shall cover at least 4" (102 mm), the number of spots to be tested in a continuous weld shall be based on a minimum of one spot every 12 inches of weld length. If the weld is less than 4" (102 mm) in length, the entire weld shall be tested. Failure of any weld to conform with the welding requirements specified herein or shown on the drawing shall be cause for rejection.

Failure of welds to conform with drawing requirements or the requirements of 3.4 shall be cause for rejection.

4.3.2 Tests. Failure to pass any phase of the required tests shall be cause for the Government to refuse acceptance of all winch assemblies until corrective action has been taken by the contractor. The winch assembly shall be fueled and serviced preparatory to testing.

4.3.2.1 Performance Test. Each winch shall be tested in accordance with the test procedure included as Appendix (A) to this specification. Test results for each winch shall be documented in the format provided in Appendix (A) and delivered to the Government in accordance with 6.3. Failure to meet any of the requirements of this procedure shall be cause for rejection.

4.3.2.2 Oil-sampling and Testing. Upon completion of the testing of each winch, oil samples shall be obtained from the forward drum hydraulic loop, after drum hydraulic loop, and gypsy hydraulic loop. These hydraulic oil samples shall be analyzed using a standard SAE particulate matter count test and a standard spectrographic analysis, and the results delivered to the Government prior to winch acceptance. The cleanliness level shall be NAS-1638 class 7 or cleaner.

4.4 Preservation and Packaging Inspection. Prior to shipment each winch shall be inspected to insure the preservation and packaging requirements of 5.1 have been complied with. The applicable section of the Preservation and Packaging Plan shall be used as the inspection criteria.

5. PREPARATION FOR DELIVERY.

5.1 Preservation and Packaging. Preservation and packaging shall be level A or C as specified (see 6.2). Preservation and packaging shall be performed in accordance with the winch assembly sections of the preservation and packaging plan supplied with the contract.

6. NOTES

6.1 Intended Use. This winch is intended for use as a part of Sealift Support Facilities on the Side Loadable Warping Tug. The winch shall be hydraulically powered and hydraulically controlled. The winch shall be rigged through an A-frame for lifting and retrieving purposes at the bow of the SLWT and shall be rigged to an anchor on the stern for warping and positioning.

6.2 Ordering Data. Acquisition documents should specify the following:

- (a) Title, number and date of this specification.
- (b) When Navy registration numbers are required (see 3.2.3)
- (c) When first article winch is required (see 3.5).
- (d) Level of preservation and packaging required (see 5.1).

6.3 Data Requirements. When this specification is used in an acquisition which incorporates a DD Form 1423, contract Data Requirements List (CDRL) and invokes the provisions of paragraph 52.227-7301 of the Federal Acquisition Regulations (FAR), the data requirements shall be developed as specified by the approved Data Item Description (DD Form 1664) and delivered in accordance with the approved CDRL (DD Form 1423) incorporated into the contract. When the provisions of FAR 52.227-7301 are not invoked, the data shall be delivered in accordance with the contract requirements.

6.3 Definitions.

6.3.1 Recovered Materials. The term "recovered materials" means material which has been collected or recovered from solid waste and reprocessed to become a source of raw materials, as opposed to virgin raw materials.